UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics

A LAND-USE CLASSIFICATION OF BENEWAH COUNTY, IDAHO

Carl Tjerandsen
Idaho Land Planning Specialist
and
Carroll Dwyer
Assistant Regional Soil Technologist

LAND ECONOMICS REPORTS - No. 3

Washington, D. C.
1939

Acknowledgments

The assistance and advice given by many individuals in connection with this report are greatly appreciated by the authors. The services of the following have been especially valuable: Harry G. Ade, Regional Director, H. E. Selby, Regional Chief, and Roscoe E. Bell, Regional Soil Technologist, Bureau of Agricultural Economics, Region 7; Meyer Wolff, Assistant Regional Forester, H. H. Gurley, Forester, and C. K. McHarg, Assistant Regional Forester, U. S. Forest Service, Region I; M. Bradner, In Charge Forest Survey, Northern Rocky Mountain Forest and Range Experiment Station; Dr. Paul A. Eke, Head, Department of Agricultural Economics, University of Idaho; J. H. Christ, Idaho State Coordinator, Soil Conservation Service, Region XI; Benewah County Commissioners, E. E. Mc Laughlin, H. H. Renfro, and Roger Tyler; the committee representing the people of Benewah County composed of S. E. Baldwin, W. S. Bennett, and Charles Doupe; and Reuben Bauer, County Agricultural Agent, Benewah County.

Unpublished data have been furnished by several agencies. These agencies include the Department of Agricultural Economics and the Department of Agronomy and Soils, University of Idaho; United States Forest Service, Region I; Northern Rocky Mountain Forest and Range Experiment Station; Idaho Emergency Relief Administration; and the County Superintendent of Schools. The services of a Works Progress Administration clerk were furnished by the Idaho State Planning Board from W.P.A. Project O.P. 65-92-787, W.P. 455.

A LAND USE CLASSIFICATION OF BENEWAH COUNTY, IDAHO

By Carl Tjerandsen, Idaho Land Planning Specialist, and Carroll Dwyer, Assistant Regional Soil Technologist

CONTENTS

SUMMARY

This land classification study was made as an attempt to reach certain conclusions regarding needed readjustments in the use of rural lands in Benewah County, Idaho. These readjustments have been necessitated by such factors as the decline of the timber industry and the

influx of new settlers into the county with a consequent increase in land-clearing activity. Unfortunately, farm sites have not always been chosen where farming can be put on a profitable basis.

To be in a position to assist settlers to find the best available locations and give some guidance in the extension of public services and credit, a study based on pertinent physical, economic, and social data has been made which classifies various areas of the county as to the best major uses to which they might be put. Three classes of lands have been differentiated as follows:

Forest areas
Areas offering special land-management problems
    a. For immediate settlement
    b. For deferred settlement
Areas suited both to cash-crop and livestock farming

Each area is here discussed in terms of the major use to which it is best suited, as well as such exceptional features as are peculiar to the area which modify such recommended use. It must be borne in mind that it is possible that some locations within areas classified as agricultural will not repay the cost of development for farming purposes. On the other hand, small acreages of agricultural land in nonagricultural areas should not be developed if the cost of providing adequate public facilities will be increased unduly. Each location must be appraised on its own merits.

Settlement possibilities in the county are confined principally to cut-over lands and undrained bottom lands. Reclamation of such lands is generally costly and should be done only when justified by the probable returns.

Checkered ownership of public lands operates to hinder efficient administration of rural lands in the county, especially the forest lands. Some means for consolidation of ownerships must be found if the greatest social good is to be realized from the use of the lands of the county.

It is hoped that all interested individuals and agencies may use the factual data contained in this report to make more beneficial use of the rural lands of Benewah County.

DESCRIPTION OF THE COUNTY AND ITS PROBLEMS

Benewah County, in the panhandle of Idaho lying along the Idaho-Washington interstate boundary line, comprises an area of 786 square miles, or 503,040 acres.

Soils and Physiography 1/

The terrain is comparatively mountainous, its chief physiographic features being the result of "the invasion of the Columbia lava flow from the west into a region of eroded valleys." Elevations range from 2,126.5 feet (the regulated level of Chatcolet Lake) to more than 5,000 feet in the mountains. The lava flow "has an average elevation of 2,600 feet in the western prairie section, rising to a maximum of about 3,000 feet." Glacial action outside of the county to the northwest modified drainage so as to form Coeur d'Alene and Chatcolet Lakes. The St. Joe and St. Maries Rivers have built up a marshy lowland belt as a result of delta-like silting.

The soils of Benewah County fall into three major groups depending on position, native cover, and soil color. These groups are: dark-colored upland soils, light-colored upland and bottomland soils, and dark-colored bottomland soils.

The dark-colored upland soils have been developed under a heavy grass growth which has added much organic matter to the soils and has given them their dark color. The surface soils are friable and fairly retentive of moisture. The subsoils are compact. These soils are associated with topography which varies from flat to strongly rolling, and the drainage is good to somewhat retarded. Under cultivation, the rolling or sloping soils are subject to severe erosion. Any permanent system of agriculture must recognize this hazard, and the rotations and systems of culture must be planned to retard run-off and erosion. The dark-colored upland soils include the Palouse silt loam, Nez Perce silt loam, and Latah silty clay loam.

The light-colored upland forest soils are fine-textured, predominantly silt loams underlain by compact silt loam or silty clay loam subsoils, have a gently sloping to rough topography; they are deficient in organic matter. Because of their compact subsoils and lack of organic matter, these soils do not absorb moisture readily, therefore they contribute to rapid run-off. These soils are suitable for agricultural use only when the topography is gently to moderately sloping or rolling.

As organic matter is deficient, the type of farming should be built around a legume rotation in order that nitrogen and organic matter may be added to the soil. To grow legumes successfully, it is necessary to add gypsum every second or third year. Extreme care must be used in the cultivation of all of these soils because of their erosiveness. The incorporation of organic matter in the light-colored soils improves their capacity to absorb and hold moisture as well as to retard erosion. Soils

1/ Soil Survey of Benewah County, Idaho. By E.N. Poulson and K.B. Platt. U.S. Depart. of Agr., Series 1930, Number 22, p. 1.

classified as light-colored upland forest soils include the Santa silt loam and silt loam, outwash phase, Benewah silt loam, Underwood silt loam, Huckleberry silt loam, and Huckleberry silt loam, red subsoil phase.

The light-colored bottomland soils were developed under coniferous tree growth in small mountain-stream valleys. Their surface texture is a loam or silt loam and the subsoil is a porous gravel or a compact silty clay loam. They have in general a somewhat retarded drainage and are deficient in organic matter. The occurrence of these soils is limited in extent, and their best use would be in conjunction with the light-colored upland soils. The light-colored bottomland soils include Potlatch loam, Peone silt loam, and Chamokane loam, light-colored phase.

The dark-colored bottomland soils have developed under a water-loving grass and deciduous shrub or tree growth along the larger streams and rivers. Their surface texture varies from a peat to a silty clay loam. The topography is level to flat, and the soils are high in organic matter. Drainage has been restricted, and most of these soils are in a marshy condition part of the year unless diked and drained. The dark-colored bottomland soils include the St. Joe very fine sandy loam, fine sandy loam, and loam, Colville silty clay, peat, and Chamokane loam.

In the rough mountainous areas, there are soils of the Benewah and Huckleberry series which have not been differentiated because of their rough broken topography, stony or shallow character, and inaccessibility. Because of the shallow, light surface soil, compact subsoil or bedrock near the surface, and steep topography, run-off is high and erosion is severe except where protected by an undisturbed vegetative cover.

Scab land areas occur along the breaks of the drainage ways which have developed in the basalt. These areas generally have a very shallow mantle of the Underwood soils. The cover is generally sparse, but does afford some grazing.

The relationship of soils of Benewah County as to native cover, general position, topography, and profile description is shown diagrammatically in figure 1.

The suitability of a soil for agriculture depends upon such factors as topography, texture, fertility, organic matter content, moisture-holding capacity, erosiveness, drainage, and depth of soil. These factors were considered in arriving at the adaptability and agricultural rating of the soils shown in table 1. The ratings of "excellent", "good", "fair", or "nonagricultural" indicate the usual rating of the soil. Under present economic conditions it is probable that soils of "fair" quality will not justify agricultural development where clearing, drainage, or similar high cost development is necessary. At any rate there is little justification for development of the lower quality lands

FIGURE 1 — RELATION OF SOILS TO TOPOGRAPHY AND NATIVE VEGETATION

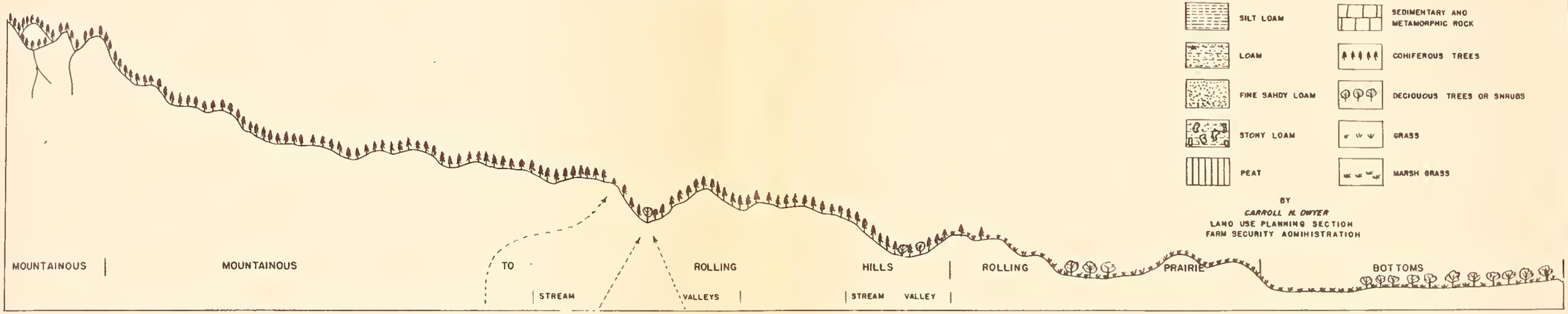
BENEWAH COUNTY, IDAHO

DATA FROM
SOIL SURVEY OF BENEWAH COUNTY, IDAHO
BUREAU OF CHEMISTRY AND SOILS

LEGEND

- CLAY LOAM
- SILTY CLAY LOAM
- SILT LOAM
- LOAM
- FINE SANDY LOAM
- STONY LOAM
- PEAT
- GRAVEL
- BASALT
- SEDIMENTARY AND METAMORPHIC ROCK
- COHIFEROUS TREES
- DECIOUOUS TREES OR SNRUBS
- GRASS
- MARSH GRASS

BY
CARROLL N. DWYER
LAND USE PLANNING SECTION
FARM SECURITY ADMINISTRATION



TOPOGRAPHY	ROUGH BROKEN	GENTLY ROLLING TO STEEP	GENTLY ROLLING TO STEEP	GENTLY SLOPING TO STEEP	FLAT TO STEEP	LEVEL TO SLOPING	FLAT TO GENTLY SLOPING	GENTLY ROLLING TO STEEP	FLAT TO GENTLY SLOPING	GENTLY SLOPING TO ROLLING	FLAT TO GENTLY SLOPING	GENTLY SLOPING TO STRONGLY ROLLING	FLAT	FLAT	FLAT TO GENTLY SLOPING
PROFILE DESCRIPTION	LIGHT YELLOWISH OR REDDISH BROWN BEDROCK	LIGHT YELLOWISH BROWN LIGHT GRAYISH BROWN BEDROCK FOR REO SUBSOIL PHASE SEE TEXTURAL DESCRIPTION	YELLOWISH BROWN FLOURY LIGHT BROWN COMPACT TOWARD BOTTOM REDDISH BROWN MOTTLED BEDROCK	YELLOWISH REO RICH REDDISH BROWN REDDISH BROWN TINGED WITH GREEN BEDROCK	REDDISH BROWN BEDROCK	BROWN TO GRAYISH BROWN LIGHT GRAYISH BROWN MIXED ORIGIN BEDROCK	GRAYISH BROWN LIGHT GRAY REO STAINING DULL GRAY COMPACT MOTTLED MIXED ORIGIN	LIGHT YELLOWISH BROWN PALE YELLOW COMPACT LIGHT GRAY SILICEOUS REDDISH BROWN STAINED WITH DARK BROWN LIGHT BROWN BEDROCK	DARK BROWN GRAYISH BROWN MOTTLED LIGHT GRAY MOTTLED MIXED ORIGIN	DARK BROWN TO GRAYISH BROWN LIGHT BROWN GRAY SILICEOUS DULL REDDISH BROWN BEDROCK	BLACK HIGH IN ORGANIC MATTER GRAYISH BROWN LIGHT GRAY SILICEOUS YELLOWISH GRAY, DARK BROWN COATING GRAYISH ORAB, STAINED OR MOTTLED BEDROCK	DARK BROWN DULL BROWN DULL REDDISH TO TAWNY YELLOW YELLOWISH BROWN BEDROCK	RICH DARK BROWN DULL DARK BROWN GENERALLY RAW DARK BROWN TO BLACK HIGH IN PARTLY DECOMPOSED ROOTS AND FIBERS VARIABLE	DARK BROWN PEATY GRAYISH BLACK OR BLUISH BLACK HIGHLY ORGANIC DARK GRAY TO DULL GRAY MOTTLED BLUISH GRAY COMPACT SLIGHTLY ALKALINE	DULL BROWN OR GRAY HIGHLY ORGANIC AND MICACEOUS DULL GRAYISH BROWN IRON STAINED HIGHLY MICACEOUS YELLOWISH BROWN IRON STAINED
SOIL SERIES	ROUGH MOUNTAINOUS	HUCKLEBERRY	BENEWAH	UNDERWOOD	SCAB	CHAMOKANE	PEONE	SANTA	POTLATCH	NEZ PERCE	LATAH	PALOUSE	PEAT	COLVILLE	ST. JOE

Table 1.--Adaptability and agricultural rating of soils of Benewah County, Idaho.

Soil	Adaptability	Usual agricultural rating	Remarks
Latah silty clay loam	Oats, barley, clover, wheat	Excellent	Rating is reduced to good or fair by poor drainage
Palouse silt loam	Alfalfa, clover, wheat, oats, peas	Excellent	Rating is reduced to good or fair on steep slopes and eroded areas
Nez Perce silt loam	Alfalfa, clover, wheat, oats, peas	Excellent	Rating is reduced to good or fair on steep slopes and eroded areas
St. Joe fine sandy loam	Alfalfa, clover, grains, potatoes, vegetables, berries	Excellent	Rating occasionally reduced to good or fair by poor drainage
St. Joe very fine sandy loam	Clover, other hays, truck crops, oats, potatoes when diked, wild hays when not	Excellent	Rating frequently reduced to good or fair by poor drainage
St. Joe loam	Hay, pasture, grain	Good	Rating frequently reduced to fair by poor drainage, gravelly subsoil or old stream channels
Colville silty clay	Wild hay and pasture, clover, oats	Good when drained	Rating frequently reduced to fair by poor drainage or "heavy" clay
Peat	Wild hay, pasture, oats	Good	Rating frequently reduced to fair by presence of raw fibrous organic matter or poor drainage
Potlatch loam	Pasture, hay, oats	Good	Rating frequently reduced to fair by compact subsoil and low fertility
Peone silt loam	Pasture, wild hays, oats	Good	Rated frequently as low as fair in frosty, poorly drained, or infertile spots
Santa silt loam	Alfalfa, grains, other hays, pasture	Good	Rating frequently reduced to fair by steep topography, eroded and infertile spots
Santa silt loam, outwash phase	Alfalfa, grains, other hays, pasture, forestry	Good	Rating frequently reduced to fair by steep topography, eroded and infertile spots

Table 1.--Adaptability and agricultural rating of soils of Benewah County, Idaho - Continued

Soil	Adaptability	Usual agricultural rating	Remarks
Chamokane loam, light-colored phase	Pasture	Fair	Rating is low because of gravel, poor drainage and low fertility
Chamokane loam	Pasture	Fair	Rating is low because of gravelly subsoil
Underwood silt loam	Forestry, pasture, hay, grain	Fair	Rating frequently reduced to non-agricultural by steep topography, shallowness, stoniness and erosiveness
Benewah silt loam	Forestry, pasture, hay, grain	Fair	Rating frequently reduced to non-agricultural by steep topography, shallowness, stoniness and erosiveness
Huckleberry silt loam, red subsoil phase	Forestry, pasture, hay, grain	Fair	Rating frequently reduced to non-agricultural by steep topography, compact stony subsoil and low fertility
Huckleberry silt loam	Forestry, grazing, pasture	Fair	Rating frequently reduced to non-agricultural by steep topography, shallowness, and frostiness
Rough mountainous land	Forestry and grazing	Non-agricultural	Rated low because of steep topography, shallowness, and frostiness
Scab land	Grazing	Non-agricultural	Rated low because of shallowness

as long as there are soils of "good" and "excellent" quality available in accessible areas. It is recognized, of course, that there are significant variations within the soil types. The principal variations which tend to decrease the usual value of the soil are also shown in table 1. It should also be mentioned that the agricultural value of the soils of the county often varies considerably within short distances.

Because of its location and physiographic features, the climate of Benewah County is not subject to severe seasonal variations. There is some variation in different parts of the county, however, because of differences in elevation and because of the influence of topography on air drainage. The prairie section has a growing season of about 5 months. While at St. Maries the average frost-free period is 127 days. It is known to be somewhat less than this in the upland valleys, although no records are available. The normal monthly, seasonal, and annual temperature and precipitation at St. Maries, based on Weather Bureau records, is shown in table 2.

Table 2.--Normal monthly, seasonal, and annual temperature and precipitation at St. Maries, Idaho 1/

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1928)	Total amount for the wettest year (1927)	Snow average depth
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	30.3	64	-24	3.50	2.04	4.81	11.0
January	28.1	59	-22	3.27	2.85	3.34	17.3
February	32.4	67	-26	2.37	.24	3.80	12.3
Winter	30.3	67	-26	9.14	5.13	11.95	40.6
March	39.3	74	-3	2.64	2.62	1.88	7.4
April	46.9	92	19	1.66	1.10	1.11	.3
May	54.1	92	25	2.07	.59	1.88	2/
Spring	46.8	92	-3	6.37	4.31	4.87	7.7
June	61.0	100	29	1.44	.33	2.43	2/
July	66.7	106	36	.77	.20	.17	0
August	65.1	101	31	.82	.17	.98	0
Summer	64.3	106	29	3.03	.70	3.58	2/
September	56.8	96	25	1.27	.30	4.88	2/
October	48.1	86	13	2.00	1.41	4.00	2/
November	37.5	73	-8	3.63	1.90	6.73	6.3
Fall	47.5	96	-8	6.90	3.61	15.61	6.3
Year	47.2	106	-26	25.44	13.75	36.01	54.6

1/ Soil Survey of Benewah County, Idaho. Op. cit., p. 5.

2/ Trace.

Present Land Use

The major types of present land use in Benewah County are shown in table 3. Approximately 63 percent of the total land area is classified as forest land (figure 2). Most of this forest land was or is forested with conifers, including Western yellow or ponderosa pine, Western white pine, lodgepole pine, white fir, Douglas fir, cedar, larch, spruce, and hemlock.

FIGURE 2 — GENERALIZED COVER TYPES, BENEWAH COUNTY, IDAHO

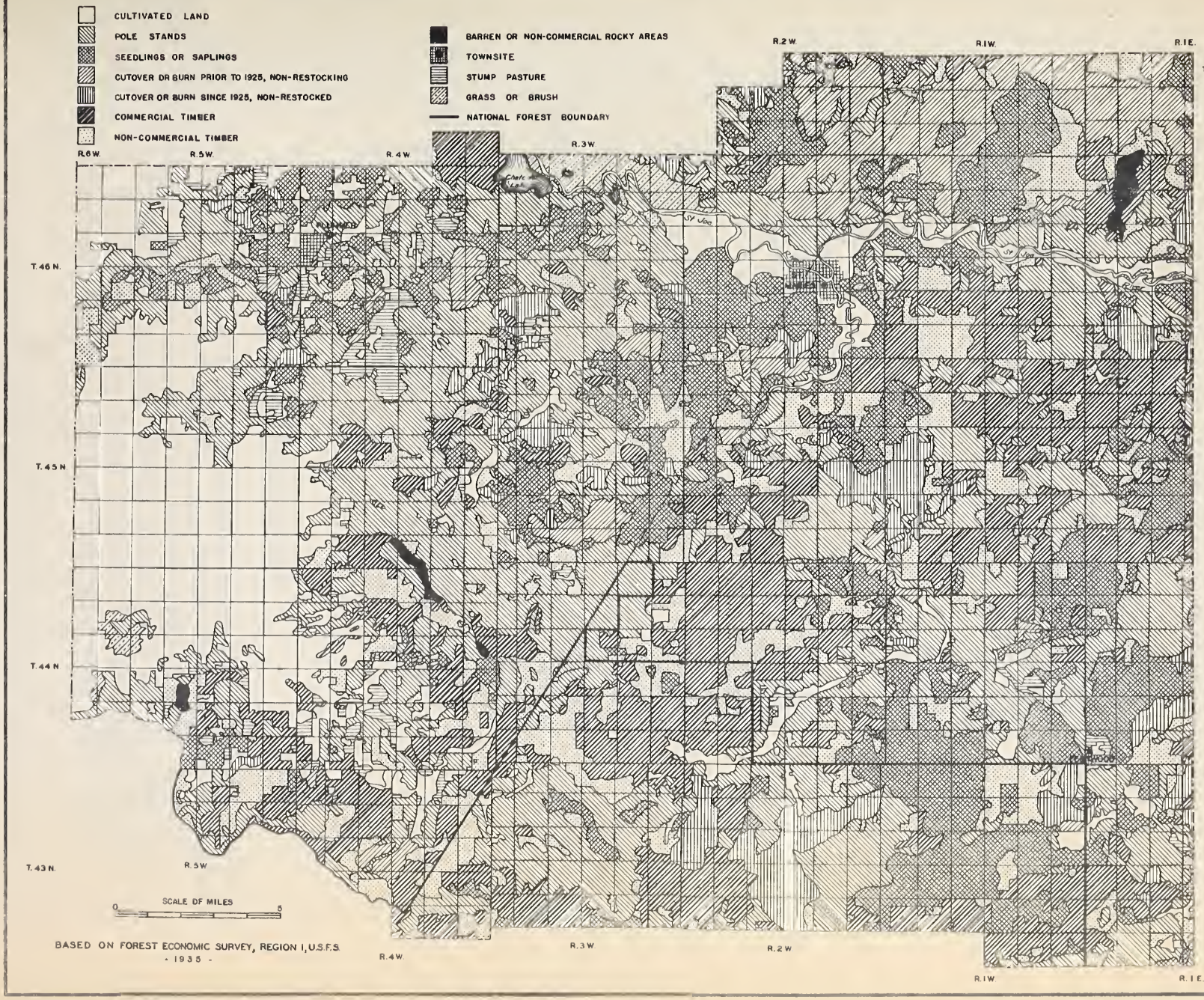


Table 3.--General classification of land
Benewah County 1/

Non-forest land	Area in acres
Townsites	1,219
Cultivated and stump pasture	79,434
Grassland	4,161
Brush	49
Total non-forest land	84,863
Forest land	
Timberland	
Producing	383,957
Deforested	26,729
Total	410,686
Subalpine	3,111
Rocky non-commercial	2,138
Total	5,249
Total forest land	415,935
Gross land area	500,798
Water area	2,242
Total area	503,040

1/ Forest Statistics, Benewah County, Idaho. Northern Rocky Mountain Forest and Range Experiment Station, Forest Survey Release No. 8, p. 2.

Agricultural Development

The first white settlers in the county were the Catholic missionaries who came to the valley of the St. Joe River in 1846 and to DeSmet in 1877. Settlement did not begin until about 1900 when it became possible to take up timber claims. Until about 1910 nearly one-half of the county was included in the Coeur d'Alene Indian Reservation, so agricultural development did not begin on any extensive scale until after that date.

Table 4.--Acreage and production of principal crops in Benewah County, in 1919, 1929, and 1934 1/

Crop	1919		1929		1934	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Wheat	18,931	359,405	22,549	561,729	14,503	362,696
Oats	4,029	107,173	2,431	88,391	3,254	102,349
Barley	56	934	750	20,989	363	6,962
Dry peas	517	5,051	1,700	21,815	2/2,060	2/44,770
Potatoes	425	31,557	509	37,003	456	24,557
		Tons		Tons		Tons
All hay	10,852	11,331	10,858	13,452	11,633	14,768
Alfalfa	201	93	1,249	1,455	1,670	2,384
Timothy	2,843	2,567				
Clover	110	174	146	168		
Timothy and clover, mixed	986	1,362	3/4,878	3/ 6,055	3/3,306	3/ 4,189
Wild hay	942	1,276	446	489	4/1,293	4/ 1,326
Grains cut green	5,497	5,490	4,047	5,148	5,352	6,857

1/ U. S. Census of Agriculture for years indicated.
2/ Includes some velvet beans and vetches.
3/ Includes some timothy sown alone.
4/ Includes some tame grasses.

Most of the agricultural development has been confined to the prairie lands, although considerable land is being cleared in the cut-over areas. Migration from the drought areas has accelerated land settlement and clearing operations during recent years. In 1935 there were 657 farms in the county, according to the United States Census of Agriculture. The acreage and production of principal crops in the county for the years 1919, 1929, and 1934, are shown in table 4. There is apparently a tendency for the acreage of cash grains to decrease and of hay to increase -- a desirable shift from the standpoint of soil conservation

Table 5 shows that the number of horses and mules decreased, but that the number of cattle and sheep increased between 1930 and 1935.

Table 5.--Number of livestock Benewah County, 1930 and 1935 1/

Livestock	1930	1935
	Number	Number
Horses and colts	1,956 2/	1,839
Mules and colts	85 2/	31
Cattle and calves	3,703 2/	6,475
Sheep and lambs	572	2,195
Swine	1,946	1,428
Chickens over 3 months old	18,842	22,494

1/ U. S. Census, 1930 and 1935.
2/ Figures for horses, mules, and cattle for 1930 exclude animals under three months of age.

The average size of farms in 1934 was 204 acres, and total land available for crops was 49,821 acres, an average of 75.8 acres cleared per farm. This figure must be interpreted in the light of the fact that the acreage available for crops per farm is much larger in the prairie areas than in the cut-over areas. 2/

In general, three types of agriculture are practiced in the county. On the Palouse prairie lands in the western part of the county, the farming systems are built around cash grain and peas. In the cut-over areas, a diversified farming system, including dairy and beef cattle, is increasingly important. In many cases, such farms are on a part-time or subsistence basis. On the bottom lands along the St. Joe River in the northeastern part of the county, dairy farming predominates.

Population and Public Services

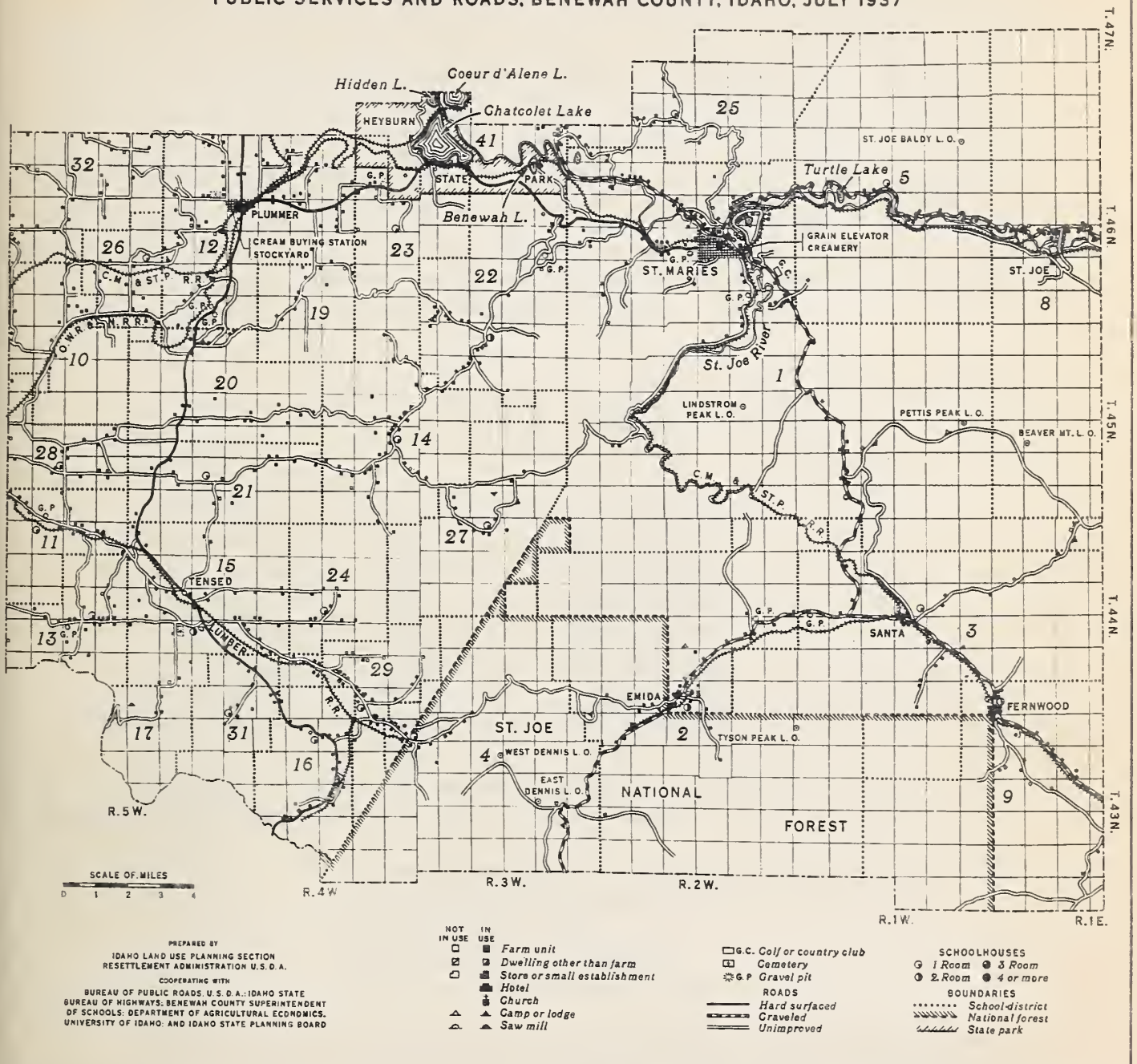
In 1930, according to the U. S. Census, the population of the county numbered 6,371, or about 8.6 persons per square mile. St. Maries was the largest town with a population of 1,996. The rural farm population in 1930 numbered 2,143, while in 1935 it numbered 2,617, or about 3.3 persons per square mile.

Locations of transportation, school, highway, and other private and public service facilities and dwellings are shown in figure 3.

2/ U. S. Census of Agriculture, 1935.

FIGURE 3

PUBLIC SERVICES AND ROADS, BENEWAH COUNTY, IDAHO, JULY 1937



PREPARED BY
IDAHO LAND USE PLANNING SECTION
RESETTLEMENT ADMINISTRATION U.S.D.A.
COOPERATING WITH
BUREAU OF PUBLIC ROADS, U.S.D.A.; IDAHO STATE BUREAU OF HIGHWAYS; BENEWAH COUNTY SUPERINTENDENT OF SCHOOLS; DEPARTMENT OF AGRICULTURAL ECONOMICS, UNIVERSITY OF IDAHO; AND IDAHO STATE PLANNING BOARD

NOT IN USE / IN USE
- Farm unit
- Dwelling other than farm
- Store or small establishment
- Hotel
- Church
- Camp or lodge
- Saw mill

G.C. Golf or country club
Cemetery
G.P. Gravel pit

ROADS
- Hard surfaced
- Graveled
- Unimproved

SCHOOLHOUSES
- 1 Room
- 2 Room
- 3 Room
- 4 or more

BOUNDARIES
- School district
- National forest
- State park

U.S. DEPARTMENT OF AGRICULTURE

NEG. 35220 BUREAU OF AGRICULTURAL ECONOMICS

The Forest Industry

Timber industry has played an important part in the economy of the county, although lumber production has varied considerably from time to time 3/ (table 6). From 1925 to 1936, inclusive, 85 percent of the timber cut was sent out from the county for milling. In the same period, 55 percent of the lumber manufactured in Benewah County came from timber stands in Shoshone County. As a result, the figures for log production do not exhibit the same shifts in volume as do the figures for lumber production. In 1925, log production amounted to 159 million board feet lumber tally; in 1932, 24 million board feet lumber tally; and in 1936, 93 million board feet lumber tally. In 1925, lumber production was 60 percent of the log production of the county, while in 1936 it was only 13 percent.

Table 6.--Lumber production Benewah County, 1909-36

Year	Board feet lumber tally
1909	38,000,000
1916	136,000,000
1925	96,000,000
1926	58,000,000
1932	6,500,000
1936	12,000,000

In recent years the average annual production of other forest products has been approximately as follows:

1.2 million linear feet poles and piling
1,430 squares of shingles
68,000 fence posts
5,000 cords of pulpwood
22,000 cords of fuel wood

If the rate of depletion by cutting that prevailed in 1935 and 1936 were to be maintained, the present saw-log supply of white pine would be exhausted in 8-1/2 years, and ponderosa pine in 14 years. Considering the present cover, and assuming a sustained yield program based on a 120-year timber rotation, figures indicate that there is a deficiency of stands that are 41 to 80 years old. When the present virgin stands have been cut, a severe decrease in the rate of cutting

3/ Data relative to the timber industry in Benewah County are taken largely from Forest Statistics, Forest Survey Release No. 8, September 1937, Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana.

will probably be necessary - even below the average rate that might be expected under such a sustained yield program.

Employment, Relief, and Land Resources

The importance of this decrease in forest resources can be seen from an inspection of data relative to employment and relief case records. In 1925, it is estimated that the lumber industry gave directly the equivalent of full-time employment to 1,400 persons in the county and supported directly or indirectly about 60 percent of the population. 4/ By 1936, the forest industry furnished employment for the equivalent of only 600 full-time workers. These figures do not include the temporary and permanent personnel of public and semi-public forest agencies. In 1935, according to the Census of Agriculture, 55.6 percent of all farm operators in the county worked off their farms a total of 32,960 man-days, or about 90 days per operator who worked off the farm. Most of this employment probably was in the forest industries.

In December 1935, there were 926 relief case records on file in the office of the Idaho Emergency Relief Administration, of which 240 were rural cases. These rural cases numbered about 37 percent of the number of farms in the county in 1935. Although data as to amount of dependency before the organization of the Idaho Emergency Relief Administration in 1934 are not available, Relief Administration officials have indicated that this represents a large increase over the period before 1934. The increase in the relief load was concomitant with a considerable decline in the number of men employed in the timber industry.

With this decline, it has been necessary to seek other means of livelihood. As a result, there has been an increase in the number of farms, but the extent to which the agricultural area can be increased is definitely limited, not only as to the maximum area that can be placed under cultivation but as to the rate at which such development can proceed.

Competition for agricultural sites has been further intensified by migration from the drought areas. Between 1930 and 1935, there was a 23 percent increase (123 farms) in the number of farms in Benewah County.5/ Of this increase, about 60 percent resulted from migration from the drought areas. 6/ Such migration has been continuing since 1935. The significant thing about this increase is that it occurred largely in cut-over areas where farms can be developed only under high

4/ Forest Statistics, op. cit.
5/ U. S. Census of Agriculture, 1930 and 1935.
6/ "Current and Recent Rural Occupancy in Idaho." Carl Tjerandsen, June 1935, p. 12. (Unpublished manuscript on file in office of Idaho Land Planning Specialist, Bureau of Agricultural Economics, Moscow, Idaho).

cost conditions, and where the average cleared acreage per farm is already much too small.

County Land-Use Problems

Not only has there been a scarcity of developed farms available for settlement, but often unwise purchases of farm lands have been made because the prospective farmer lacked experience. When settlement has occurred on lands of low productivity, the result has often been subsidies for relief, roads, schools, credit, etc., as well as the loss of individual capital investments. For example, 79 out of 146 rural relief clients were located in areas the best use of which is for forestry. In two school districts in cut-over areas, the proportions of total revenue derived from sources outside of the district exceeded 80 percent. Such subsidies place a burden on other lands in the county.

The exploitation of the timber resources of Bonewah County has been hastened unduly by the combined effect of such factors as high protective costs, speculative risk attendant upon holding stumpage, unsuitability of the general property tax to the forest industry, and high per capita cost of providing public services in areas of scattered settlement. As a result, the annual cut of timber is greatly in excess of the annual growth. Once these lands have been cut over, there are obstacles in the way of instituting sound forest-management practices on those lands that are best suited to forest uses. In the first place, these lands often become tax-delinquent and are foreclosed by the county. Under existing law, these lands are usually offered for sale at public auction. This prevents their being placed in the hands of an agency qualified to manage them efficiently. Even after these lands have come into public ownership, the fact that the ownership pattern is so checkered prevents the application of an efficient management plan.

If the lands of the county are used in accordance with their capabilities, a sound economy based on agricultural and forest resources can be established which will promote an optimum relationship between the people of the county and its resources. It is important, therefore, that new settlement be confined to those lands on which agriculture can be placed on a stable basis. Only by such restriction can the burden of unwarranted subsidies for public and private services be reduced. If cut-over lands are to be used for agriculture, however, it must be recognized that some means must be found to make the clearing of land less expensive and less time-consuming, because economic self-sufficiency in a cut-over area is as much a matter of having enough land in cultivation as it is a matter of adaptability of the land.

CLASSIFICATION

Objectives and Method of Classification

The land-use problems referred to above point to the purpose of the study here reported, which is to lay the foundation for a sound

rural land-use action program for the county, including the following features:

(1) To determine the areas in which present occupancy is undesirable,
(2) To guide land settlement into desirable areas,
(3) To afford guidance in the distribution of public services, and
(4) To afford guidance to various public and private credit agencies.

The procedure followed in classifying the land involved four major steps. First, the land-use areas were differentiated on the basis of their physical characteristics, particularly soils, topography, climate, and cover types. This was the primary basis for the final classification because physical factors are basic in land use. Also, in Benewah County, agricultural development has not proceeded to its limit so the available data for many areas were physical rather than social or economic in character. The interpretation of the physical data depended, in large measure of course, upon economic data drawn from areas where comparable aggregates of physical factors have been exploited. Second, the effect was studied of such economic and social factors as changes in ownership of rural lands, rural tax-delinquency, crop yields, assessed valuations of agricultural lands, relief case records, distribution and cost of public services as they modified or supported the physical classification. The physical classification was then changed where necessary. Third, the boundaries of the various land-use areas were checked by field inspection. Fourth, the findings were checked and modified in consultation with local people who were familiar with the problems of the county.

The Land Classes

The classification of lands as made (fig. 4), differentiates three major types of recommended land use:

(1) Forest areas
(2) Agricultural areas offering special land management problems
    (a) For immediate settlement
    (b) For deferred settlement
(3) Agricultural areas suited both to cash-crop and livestock farming.

It must be recognized that the areas so differentiated are somewhat generalized and include within their boundaries small areas which may vary widely in their adaptability. Persons interested in specific tracts should investigate each on its merits.

FIGURE 4 — RECOMMENDED LAND USE CLASSIFICATION, BENEWAH COUNTY, IDAHO — MAY 1938

PREPARED BY
DIVISION OF LAND ECONOMICS, BUREAU OF AGRICULTURAL ECONOMICS, U S O A, COOPERATING WITH: DEPARTMENT OF AGRICULTURAL ECONOMICS, UNIVERSITY OF IDAHO; U S FOREST SERVICE, REGION I; NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION, IDAHO STATE PLANNING BOARD, WORKS PROGRESS ADMINISTRATION

FOREST AREAS

AGRICULTURAL AREAS OFFERING SPECIAL LAND MANAGEMENT PROBLEMS
- For Immediate Settlement
- For Deferred Settlement

AGRICULTURAL AREAS SUITED BOTH TO CASH-CROP AND LIVESTOCK FARMING

R5W R4W R3W R2W R1W R1E

T47N T46N T45N T44N T43N

Hidden L.
Coeur d'Alene L.
Chatcolet Lake
HEYBURN STATE PARK
Benewah Lake
PLUMMER
ST. MARIES
St. Joe
St. Joe River
St. Maries
Tensed
Santa
Fernwood
Emida

ST JOE NATIONAL FOREST

SCALE IN MILES
0 1 2 3 4 5

Forest Areas (Areas 1 and 1A)

These lands have, in general, the following characteristics: (1) the topography is rough and broken, thereby making it difficult to obtain economic-sized farm units; (2) the soils are deficient in organic matter and are highly erosive unless protected by a permanent vegetal cover; (3) climatic conditions are, in general, unfavorable for crop production, although favorable for the production of white and ponderosa pine as well as other species; and (4) crop yields are low. The resultant effects of these adverse factors can be found in the large number of farmers on relief and in the high per capita cost of maintaining public services, including schools.

Description of Areas. Reference to the map called Recommended Land-Use Classification in Benewah County, Idaho, (fig. 4) will indicate the location of the areas hereinafter discussed.

Area 1 includes the rugged, mountainous portions of the county. The rough topography is the chief characteristic making these areas unsuitable for agriculture. There are, of course, small areas classified as forest land which are physically suited to limited agricultural use, but they are generally small, isolated, lacking in nearly all public facilities, or subject to severe climatic hazards. Settlement in these areas also handicaps administration and adequate fire protection of the forest lands. At present, most of the area does not have a cover of marketable-sized timber, but carries second-growth, or is comprised of cut-over and burned tracts, only part of which is restocking naturally (fig. 2). Some of these lands are being artificially restocked by the U. S. Forest Service.

The soils are generally residual in character, mainly shown as "rough mountainous" on the soil map but including the Underwood, Huckleberry, Benewah, and small rough areas of the Santa series, as well as the light-colored phase of the Chanokane series along the creek bottoms, all of which are generally not suited to agriculture. But they have supported a forest cover in the past and, given adequate management, will continue to do so.

In September 1934, practically all of the rural lands in the county which were tax-delinquent for 1928 and 1929 were in this area. These were cut-over or burned-over lands for the most part. Those lands in area 1 having no tax-delinquency generally were in commercial-timber areas.

The greater part of area 1 is in corporate ownership, although the area includes considerable areas of National Forest and public domain, especially in the southern and eastern parts of the county. Scattered throughout the other ownerships are tracts owned by private individuals, some of which are merely timber claims, the others occupied usually with some attempt at farming. It is of interest to note certain shifts of ownership between 1933 and 1936. During that time, credit corporations

acquired about 80 parcels of land and disposed of about 40 parcels in this area. These were probably acquired as a result of mortgage foreclosures. The county, on the other hand, acquired 3 parcels and disposed of about 13. Undoubtedly, the tax moratorium slowed down the acquisition of land by the county through tax-foreclosure proceedings.

The great bulk of the relief-case load was concentrated in area 1. For example, out of a total of 146 rural relief clients whose farms could be located, 79 were to be found in this area. According to the Statewide Highway Planning Survey, there were 131 occupied farm dwellings in area 1, indicating that about two-thirds of the operators in area 1 were on relief. 7/ Although some locations might prove profitable for agricultural purposes, experience indicates that forestry, rather than agriculture, is the highest use to which these lands are capable of being put. It should be noted, however, that these lands can prove valuable for grazing purposes and can thereby supplement the adjacent agricultural lands.

Area 1A, which lies north of Mashburn, is discussed separately from area 1 because its accessibility makes it a more critical area. The soil types include the Underwood, Benewah, Huckleberry, and Santa series, the better areas of which are of fair or even good quality. The topography, in general, is moderately rolling to rough and broken. Several small parts of the area have a topography suitable for agriculture, but the soils are generally shallow and rock outcrop is very common. It would be extremely difficult, owing to shallow soils or broken topography, to obtain a sufficient number of economic-sized farm units in a contiguous area to warrant the provision of public services, especially schools. The southern half of the area is covered with a heavy growth of commercial timber, while the northern half consists of either pole stands or nonrestocking burned or cut-over areas. Very little of this land is in use for agricultural purposes at present, there being only five occupied farm dwellings in the area. The fact that United States Highway No. 95-E runs through the area should not be allowed to influence the use of the area in the direction of an expansion of agriculture.

Most of the lands are now in corporate ownership with a few scattered individual holdings and about two sections of public domain. The available evidence indicates that these lands should remain in forest rather than be developed for agriculture, expecially as other parts of the county are much better adapted to settlement.

Conclusions and Recommendations. These areas are unsuitable for agriculture, and settlement for this purpose should be discouraged. The best major use is for forestry. With proper management,

7/ Statewide Highway Planning Survey, 1936. Idaho Bureau of Highways and Bureau of Public Roads, U.S.D.A. cooperating. Subsequent references to numbers of occupied farm dwellings are based on this survey.

these lands should continue to support a timber industry which is of major importance in the county. 8/

There are several difficulties, however, in the way of instituting multiple-use management of these lands, including provision for sustained yield of forest products. One of the most important obstacles is the checkered ownership pattern. Unless these lands can be administered in large consolidated units by some agency (or agencies) which is prepared to do so from a long-range economic and social viewpoint, it will be impossible to realize the potentialities of the forest lands in terms of a stable forest industry and of flood control, game conservation, recreational development, and watershed protection.

Under existing conditions, private interests cannot be expected to carry the entire burden of a long-time forest program in Benewah County. In the first place, many of the benefits that might be realized from such a program naturally would accrue to society as a whole. Secondly, fiscal considerations are not favorable to the assumption of such a responsibility by private agencies. The burden of such a long-time forest program makes itself felt in terms of:

(1) High per capita cost of providing public services in areas of scattered settlement,
(2) Unsuitability of the general property tax to the problem of taxing timber properties annually when the timber operations are on a deferred yield basis,
(3) Speculative risks attendant upon long-term investments in the face of uncertainties that confront the timber industry,
(4) High expenditures necessary for protection of timber stands from fire, insects, disease, etc.,
(5) Outlays or sacrifices necessary for reforestation of forest lands or adoption of sustained-yield cutting practices in mature stands,
(6) Burden of indebtedness against private timber holdings.

Some of these problems point to readjustments that are needed to promote sound forest land use, such as: a modified general property tax based primarily upon time and amount of income rather than upon stumpage value, reduction of local governmental costs in forest areas, social control of settlement to prevent the necessity for providing excessive public subsidies for the maintenance of public services at high per capita cost, and increased participation by society through public agencies in assuming the burden of management and protection against fire and disease needed to secure the maximum benefits from forest lands supporting stands which are immature or which have been denuded of their forest cover.

8/ Forest Statistics, op. cit.

The recommendation for the forest-land areas may be summed up as follows:

(1) To discourage the extension of settlement into areas not suited to agriculture, the following directional measures should be adopted: rural zoning against settlement in forest areas, subject to exceptions by ordinance; refusal by Government credit agencies to advance credit for agricultural uses in such areas; and refusal by the county to sell lands for agricultural purposes in non-agricultural areas.

(2) Sustained yield programs should be encouraged through reduction of carrying charges on mature timber lands.

(3) The acquisition by public agencies, State or Federal, of lands denuded of timber or bearing immature stands should be encouraged. Legislation is needed providing for transfer to the State of title to tax-foreclosed non-agricultural lands to prevent their return to undesirable use. Exchanges of land between State and Federal governments to round out and consolidate their holdings into economic administrative units should be encouraged by procedure-simplifying legislation.

Agricultural Areas Offering Special Land Management Problems (Areas 2 to 11)

These lands are so classified because the production of particular crops is limited by one or more of the following conditions: (1) soils developed under a coniferous forest cover are deficient in sulphur and are comparatively low in organic matter, (2) moderately rough topography which makes it difficult to obtain fields large enough for the use of efficient farming methods and machinery, (3) a tendency toward severe sheet and gully erosion on cultivated lands, and (4) localized frosty areas. Included in this class are lands that are not adapted to cultivation, but because of their cover conditions and proximity to lands well-suited to cultivation, are desirable additions to the farm enterprise from the standpoint of grazing and farm woodlot uses. Also included is one area (area 4) in which additional settlement should be deferred until better lands in the county have been developed.

The total acreage of the lands in this class amounts to about 62,000 acres.

Description of Areas. Area 2 includes several areas adjoining the prairie lands in the northwestern part of the county. They consist of bodies of Santa, Nez Perce, and Latah soils which are generally excellent to good in quality. The topography is gently sloping to strongly rolling, but is often cut by moderately deep drainageways, thus isolating bodies of land and making them unsuited for agricultural

use because of their small area. These lands are partially under cultivation, the remainder being covered with old stands of timber. Data of wheat yields are fragmentary, there being only nine yield records available from the wheat-allotment contracts. Half of these farms have yields of less than 20 bushels per acre, and the remainder range between 20 and 40 bushels per acre.

With proper management, these lands are suited to agricultural uses, including cultivation, pasture, and farm woodlot.

Most of these lands are now in Indian ownership, although there are a few scattered private holdings. There is a school at Plummer and another 3 miles north of Tensed (fig. 3). There was only one rural relief client out of a total of 23 families in the area in 1934 and 1935.

Area 3 includes bodies of good to fair soils of the Santa, Chamokane, and Peone series near Plummer. They have a gently sloping to moderately rolling topography, often cut by deep drainage ways. Many farms of small acreage are found, while the remainder of the area not covered by farms is about equally divided between seedlings and saplings, pole stands, and non-commercial timber.

This area is served by a school at Plummer and another on Plummer Creek.

Of the 47 farm families in this area, 13 were on relief in 1934 and 1935. It should be noted, however, that in many cases farmers were on relief not because their farms were poor from a physical standpoint, but because they did not have sufficient land under cultivation (fig. 5).

The area is suited to agricultural use.

Area 4 is known as Benewah Valley and lies north of the Benewah school. The soils which are mainly good to fair in quality consist of the Santa, Chamokane, and Peone series, with Santa predominating. The topography of the bottoms is gently sloping, while in the uplands it is moderately rolling or sloping. Many drainage ways are found which make for small fields. Part of the area is occupied by several farms of small acreage, while the remainder is covered chiefly with pole stands of white pine and Douglas fir.

Practically all of these lands are held by individuals, usually in tracts of less than 160 acres. There were 30 occupied farm homes in 1936. There are two schools in the valley, only one of which is operating. There were seven rural relief clients in the area in 1934 and 1935.

Because of the possibility of isolation in severe winter weather, the broken character of the topography, frost hazard, and less fertile soils, it would be advisable to develop other parts of the county before extending agricultural development in this valley.

Area 5 includes several tracts found south of Tensed. The soils which are mainly good to fair in quality consist principally of members of the Santa and Benewah series. The topography is gently to moderately sloping or rolling, with occasional rough broken areas too small to deal with separately. Parts of the areas are farmed at present. The remainder is covered with pole-size stands of timber, stump pasture, or small bodies of commercial timber.

Most of these lands are in Indian ownership, the private holdings in the area being limited largely to the lands south of Sanders. The areas are all accessible by gravelled or oiled roads. School facilities are adequate. Wheat-yield records are comparatively scarce, but indicate that yields range from 15 to 30 bushels per acre. In 1936, there were 69 occupied farm homes in the area. There were about 21 rural families on relief at one time or another during 1934 and 1935. Insufficient cultivated land is the chief cause of dependency.

Area 6, east of Tensed in the vicinity of the Fir Grove School, has only fair quality soil. Although it is shown on the soil survey map as a red subsoil phase of the Huckleberry soil series, field examination has shown that only part of this body of soil contains the red subsoil, as described, while the remainder is of an unmapped series. The topography is gently to moderately sloping. Approximately one-third of the area is under cultivation (there were 15 occupied farm homes in 1936), while the remainder consists of stands of pole-size timber and seedlings or saplings.

The area is accessible by gravelled and dirt roads. There were six rural clients on relief.

Care must be taken in selecting soils in this area for agriculture, since the soil is sometimes shallow and stony, and is very difficult to work where the red subsoil phase predominates.

Area 7 includes the numerous small areas just north of the St. Joe River and those occurring adjacent to St. Maries. The topography varies from gently sloping to moderately rolling and, occasionally, strongly rolling. Nearly every individual area is at least partially cultivated, the remainder being in stump pasture, or small pole-size stands of timber, although some of the areas are cultivated in their entirety.

They are nearly all in individual ownership. Each area is accessible by graded dirt or gravelled roads. There is a school at St. Maries and another one just east of Turtle Lake. There were only three rural relief clients in this area in 1934 and 1935. In 1936, there were 29 occupied farm homes in the area. These small areas are important chiefly because they provide building sites and supplemental fields which adjoin the flat, poorly drained bottom lands along the St. Joe River.

Area 8 includes the three small areas found near the Grass Mountain School in the extreme northern part of the county and one small area south of the St. Joe River. Those north of the river are an extension of the Harrison Flats in Kootenai County. The soils which are good to fair in quality consist chiefly of the Santa series. The topography is moderately rolling. Four farms are to be found in these areas, the remainder being covered with small, pole-size stands of timber, or seedlings and saplings.

Area 8 is all in individual ownership. There was only one rural relief client in the area. Access to the area is somewhat difficult during the winter months because of snow.

Area 9 is a relatively large area near Emida. The soils which are of good to fair quality consist principally of the Santa, Potlatch, and Peone series. The topography is level to moderately rolling with small areas of broken topography adjacent to Santa Creek. Nearly all of the bottom land is under cultivation or in pasture, while most of the uplands are covered with pole-size stands of timber. A small body of commercial timber is located in the northern part of the area.

The ownership in the area is about equally divided between individuals and corporations. United States Highway No. 95-E traverses most of the area. There is a school at Emida. There were about eight rural relief clients in the area in 1934 and 1935, representing about 40 percent of the occupied farm homes in 1936.

Additional settlement in this area would be desirable.

Area 10 is the narrow valley along the St. Maries River and Santa Creek just north of Santa. The soils, which are excellent to fair in quality, consist chiefly of the St. Joe and Santa series. The topography is level to gently sloping. This valley is often subjected to spring overflows as well as to late spring frosts. It is nearly all under cultivation, the part not cultivated being covered by willows and cottonwood.

About one-half of the area is in State and county ownership, the remaining lands being in private ownership. The area is accessible by United States Highway No. 95-E. There is a school available at Santa. There were only two occupied farm homes in 1936. One family was on relief in 1935.

Area 11 includes several bodies of land adjacent to Fernwood, Tyson, and Santa. The soils, which belong to the Santa, Potlatch, Underwood, Benewah, and Chamokane series, are good to poor in quality. Small bodies of scab land are also included. The topography varies from level or gently sloping in the narrow stream valleys to moderately rolling or sloping in the uplands. Many small streams are found in these areas and small areas of broken topography may be expected. Several moderately

large acreages in this area are farmed, and numerous, small, partially cultivated tracts can be found. The remainder of the area is covered with seedlings and saplings, pole-size stands of timber, non-commercial timber, and some recently burned-over and non-restocking areas.

About one-fourth of the land is in public ownership, primarily State with some public domain and county land. The remainder is about equally divided between corporate and individual holdings. There were 27 occupied farm homes in 1936. The areas are accessible, for the most part, by gravelled roads. School facilities are available at Fernwood and Santa. There were three rural relief clients in the area.

Additional settlement would be desirable in this area.

Conclusions and Recommendations. On the basis of information obtained from the Idaho Agricultural Experiment Station and other sources, it is apparent that in the cut-over areas of northern Idaho about 160 acres of land are needed for an economic farm unit, of which at least 80 acres should be in cultivation. Of the remainder, a large proportion should be improved pasture and the rest in farm woodlot. It must be recognized that although agriculture is the recommended use for the area as a whole, there is a considerable acreage of land which should not be cropped, but should be left in pasture or woodlot. Such lands are essential, however, to a well-rounded farm enterprise in these areas. It should be noted that although the total acreage per farm in the cut-over and bottom land areas averages about 190 acres, land available for crops per farm averages only about 40 acres. 9/ There are very few farms in these areas which have 80 acres of land available for crops, the amount recommended as a minimum requirement.

On the basis of recommendations made by the Idaho Agricultural Experiment Station and other agencies for the cut-over area, about 60 percent of the crop land should be devoted to perennial legume crops, principally alfalfa. On the basis of 80 cultivated acres per farm unit, about 50 acres of alfalfa would produce approximately 65 tons of hay. The annual hay requirement per milk cow is about four tons of alfalfa, including that required to carry calves and heifers. This would support a 15-cow dairy unit with an annual production of 250 pounds of butterfat per cow. An average sale price of 20 cents per pound of butterfat would yield a gross income of around $825 per farm unit. To utilize the available skim milk and other farm byproducts, it would be desirable to keep about six brood sows which will average two litters each of about six pigs per litter. Cash income from this enterprise will approximate $700. This, if supplemented with about 10 acres of grass seed as recommended by the Experiment Station, would bring the cash income well up towards $2,000 per farm unit. This is considerably above the average cash income of farmers in the cut-over areas at the present time, and

9/ U. S. Census of Agriculture, 1930, by minor civil divisions.

is considered adequate for a satisfactory standard of living in these areas. Cash expenses in this type of farming are relatively low, the major items being seed, fertilizer, a small amount of hired labor, and taxes and depreciation on buildings and operating equipment. From experience of the Farm Security Administration, it would appear that these cash expense items would be considerably under $1,000 per farm unit, leaving a balance of approximately $1,000 for payment of land costs and cash living expenses. In addition, the farm will contribute an appreciable amount of non-cash income in the form of milk, meat, and garden products.

According to recommendations made by members of the staff of the Idaho Agricultural Experiment Station, there are several things essential to good land management. In the first place, legumes must occupy a prominent place in the crop rotations practiced. Alfalfa and sweetclover are the two legumes most commonly used. They have the effect of increasing the supply of available nitrogen and helping to reduce the resinous toxicity of the forest soils. 10/ Second, crop residues should be turned under as a soil-conserving measure. Third, owing to a deficiency of sulphur, the addition of gypsum has a marked effect on the production of legumes. The usual practice is to apply it to the legume crop at the rate of 200 pounds per acre in alternate years. Fourth, the steep slopes and draws must be seeded down to permanent pasture to prevent soil erosion. A considerable portion of the areas must be treated in this way. 11/ At the critical margins of land use, the factor of management becones increasingly important.

Because of small fields, low yields of wheat, and high erosiveness, it is apparent that these areas cannot compete with the Palouse prairie lands on a cash-grain basis. It is, in most cases, more efficient to keep livestock, and to feed legume and other crops grown on the farm than it is to produce grain on a cash basis. Furthermore, such a system permits the effective utilization of the uncultivated lands on the farms. The particular type of livestock enterprise selected will depend, of course, on local conditions, such as types of pasture available, transportation facilities, relative labor requirements, and ability of the farm to produce winter feed.

These, then, are the essential requirements:

(1) A minimum-size unit of 80 acres of cropland in addition to pasture land,

10/ Soil Survey of Benewah County, Idaho. Op. cit., p. 8.
11/ Rotations specifically adapted to cut-over areas have been recommended by the Idaho Agricultural Experiment Station at Moscow, Idaho. Information can be obtained by writing to the station.

(2) A rotation in which legumes predominate,
(3) The application of gypsum on legumes where a sulphur deficiency is apparent, and
(4) Substitution of a feed-livestock enterprise for the cash-grain system.

In conclusion, it must be stressed that lands adjacent to the forest areas especially must be managed with careful regard for the maintenance of soil fertility and the control of erosion, if agriculture is to be placed on a stable basis.

Agricultural Areas Suitable for Cash-Crop and Livestock Farming (Areas 12 to 15)

In contrast with the "Agricultural Areas Having Special Land Management Problems," these lands (principally prairie and diked river bottom lands) have sufficiently favorable combinations of soil, topography, and climate to make possible the production of all of the crops generally adapted to the region. The areas are well suited to the production of cash-grain as well as being adapted to the combination of cash-grain and livestock enterprises. Included in this class are lands that are not adapted to cultivation, but because of their cover conditions and proximity to lands well suited to cultivation, are desirable additions to the farm enterprise from the standpoint of grazing and farm woodlot uses.

The total area of the lands in this class is approximately 60,500 acres.

Description of Areas

Area 12 includes the prairie lands in the western part of the county. The soils which belong to the Palouse, Nez Perce, and Latah series are principally excellent to good in quality. The topography is level in the bottoms occupied by the Latah soils and gently to moderately rolling on the hill lands. Small steep breaks are encountered throughout the rolling hill lands, but they are too small to be dealt with separately. Nearly all of the land is under cultivation, that not cultivated being covered by small brush, or pole-size stands of timber. The great bulk of the wheat-yield records indicates that yields vary from 20 to 40 bushels per acre.

These lands are largely in Indian ownership. They are all served by oiled, gravelled, or dirt roads. Several schools are available. In 1935 there were only two rural relief clients in the whole area, although in 1936 there were 111 occupied farm homes.

Unless the trend toward larger farm units is reversed, perhaps as a result of programs designed to promote soil conservation, there is little opportunity for additional settlement in this area.

Area 13 includes lands adjacent to Lake Chatcolet and along the St. Joe River east of Chatcolet. These lands are undrained at present, but are potentially agricultural if and when drained. The soils belong to the Colville and St. Joe series. Peats are also included. Although these soils are principally of excellent to good quality, when drained their utilization is dependent upon improvement by drainage. The topography is flat, but is cut up by the St. Joe River. Most of these lands are now covered by brush or wild grass.

Two properties were acquired by credit corporations between the years 1933 and 1936. These lands are accessible by an oiled highway bordering the area.

The economic feasibility of reclaiming these lands through drainage requires further study. One controlling factor is the possibility of reducing the severity of floods in the Spokane River drainage.

Area 14 is the St. Joe valley running from St. Maries along the St. Joe River to the county line on the east. The soils are usually excellent to good in quality when drained since they belong to the St. Joe, Colville, Chamokane series, and Peats. Part of the area is poorly drained during the spring and early summer. The topography is flat. Nearly all of the area is under cultivation, the remainder being covered with willow and cottonwood.

Credit corporations acquired two properties between 1933 and 1936. There are schools at St. Maries and Omega. There was only one rural relief client in the area. The Statewide Highway Planning Survey showed 37 occupied farm homes in 1936.

Area 15 is a small valley along the St. Maries River in the southeastern part of the county, and consists entirely of the excellent to good quality soils of the St. Joe series. It has a level topography. This area is, in general, well drained and is nearly all under cultivation. That part not cultivated contains willows, cottonwoods, and some pole-size timber. It is practically all in individual ownership. There is a school at Fernwood. There were four occupied farm homes in the area in 1936.

Conclusions and Recommendations

In general, the lands in area 12 are highly adapted to agriculture. The problem is one of management rather than major land use. Maintenance of soil fertility is the critical factor in the stabilization of agriculture on these lands. The continuous cropping of wheat in alternation with summer-fallow or peas has resulted in the depletion of organic matter and nitrogen. As a consequence, erosion has been accelerated, moisture retention impaired, and yields have declined. To correct

this condition, alfalfa and sweetclover should be added to the rotation.

More specifically, about 20 to 30 percent of the farm acreage, on the average, should be retired from crop use as an erosion-control measure. This will involve permanent seeding of gullied areas, steep slopes, and hilltops to alfalfa and grass mixtures. The remaining land should be cropped under rotations which include grains, peas, potatoes, sweetclover, alfalfa, and fallow in varying proportion. 12/ With the increase of feed supplies a corresponding increase in livestock numbers will probably be desirable.

It should be mentioned in passing that the fact that a large proportion of these lands is in Indian ownership complicates the administration of programs designed to control erosion and maintain soil fertility. Tenant operation of these lands makes the situation even more serious. A definite soil conservation program is needed for these lands.

With reference to size of farm, little can be said at this time. Apparently the profitableness of large-scale farming, at least in the short-run, has led to an increase in the size of operating units, some units being 640 acres or more in size. Although cash returns may have been increased, there is some evidence that conservation of the soil has not been promoted. In any event, additional research is needed to determine the relationships among such factors as size of farm, type of farm, soil conservation, and the farm as a business.

In areas 13 and 14, the land-use problems are somewhat different. If the lands in area 13 were to be drained, as they have been in area 14, they could be made very productive. It will require additional study, however, to determine whether or not floods elsewhere in the Spokane River watershed, which affect the levels of Coeur d'Alene and Chatcolet Lakes as well as the lower reaches of the St. Joe River, can be controlled sufficiently to permit the diking of this area on an economic basis. If drained, the area would be well adapted to intensive agriculture including dairy and truck garden enterprises.

In area 14, the principal readjustments needed are a shift in the production of oats and hay from a cash-crop basis to a livestock basis, a reduction in the oats acreage and an increase in the acreage devoted to hay, supplemental irrigation of pasture and hay lands, and an increase in the acreage devoted to truck crops, including berries.

A dairy unit on these bottom lands would require about 40 acres as a minimum, of which about two-thirds should be devoted to hay pro-

12/ Further information concerning desirable rotations and cropping practices may be obtained by writing to the Idaho Agricultural Experiment Station, Moscow, Idaho.

duction and the remainder devoted largely to pasture. To increase hay and pasture production, the feasibility of pumping water for irrigation from the river should be considered. The amount of available pasture could be supplemented by pasturing the hay land after the second cutting has been taken. The cash income of the farm could be further supplemented by utilizing a portion of the farm acreage for the production of truck crops. Because hay yields are in general more than twice as high on bottomlands as on cut-over lands, the 40-acre farm unit recommended would furnish an income similar to that obtainable from the 80-acre (cropland) farm unit discussed for the cut-over areas.

A desirable truck garden unit would have a minimum of about 10 acres. Such crops as strawberries, potatoes, and cabbage do very well on these lands.

In area 15, lower productivity, less land available for hay production, and a larger amount of available native pasture than is the case in area 14 would indicate the desirability of a more extensive type of enterprise. Substitution of some beef for dairy cattle would permit the more complete utilization of the land. This would, however, require somewhat larger farm units than in area 14. The native pasture is of sufficiently high quality in average years to permit lambs to be taken directly from such pasture and marketed as grass-fat in eastern markets. But because of the difficulty of wintering sheep in the area it is not suggested that sheep should be substituted for beef in the livestock enterprise.

LAND SETTLEMENT

Settlement in Benewah County has been characterized by marked variations in the degree of success attained in various parts of the county. Because the adaptability of the prairie lands to agricultural use is well-established, the discussion of land settlement will be confined largely to the cut-over and bottom lands. It will suffice to say that unless economic conditions force a subdivision of the large operating units which are characteristic of the Palouse area, it is not probable that additional settlement can be accommodated in the area except by replacement. The increasing seriousness of soil erosion which can be controlled satisfactorily only under a changed cropping system may be the factor that will force such subdivision.

Settlement in the cut-over areas (corresponding roughly to the lands classified as "Agricultural Areas Offering Special Land Management Problems"), beginning in 1900, was stimulated primarily by a desire to exploit the timber resources of the county. Small acreages were cleared to furnish partial subsistence or to produce truck crops and hay which found a ready market because of the rapidly expanding timber industry. But on the whole, lack of experience and knowledge of conditions in cut-over areas, the difficulty of clearing land, the

decline in the market for produce, and the exhaustion of supplemental employment in certain areas resulted in a large number of failures. This condition is still characteristic of many cut-over areas in the county. Data from relief case records bear this out.

By the end of 1935, there were relief case records in the files of the Idaho Emergency Relief Administration office in Benewah County covering 240 rural families, representing about 37 percent of the total number of farms in the county in 1935. Many of these families are still receiving relief in one form or another.

The reasons for dependency were numerous, some involving personal deficiencies of the clients while in other cases the responsible physical and economic factors, related to land use, were:

(1) Attempts by clients to develop farms which are submarginal from the standpoint of soils, topography, climate, etc.,
(2) Difficulty of clearing cut-over land which has prevented clearing a sufficient acreage to provide a family living,
(3) Decreasing availability of supplementary employment.

Assuming 80 acres of cropland to be the minimum required in cut-over areas, the economic position of these relief clients can be readily seen from an inspection of figure 5. Unfortunately, unless supplementary employment or a means of hastening or cheapening land-clearing operations can be found, the possibility of a minimum farm unit being obtained by these relief clients is remote. Indeed, limitations imposed by soil, topography, and other factors operate to make this an impossibility in many cases.

As far as new settlement is concerned, it has already been pointed out that there is little possibility of obtaining a farm in the Palouse area. The chief possibilities exist in connection with lands requiring reclamation, either by drainage or by clearing.

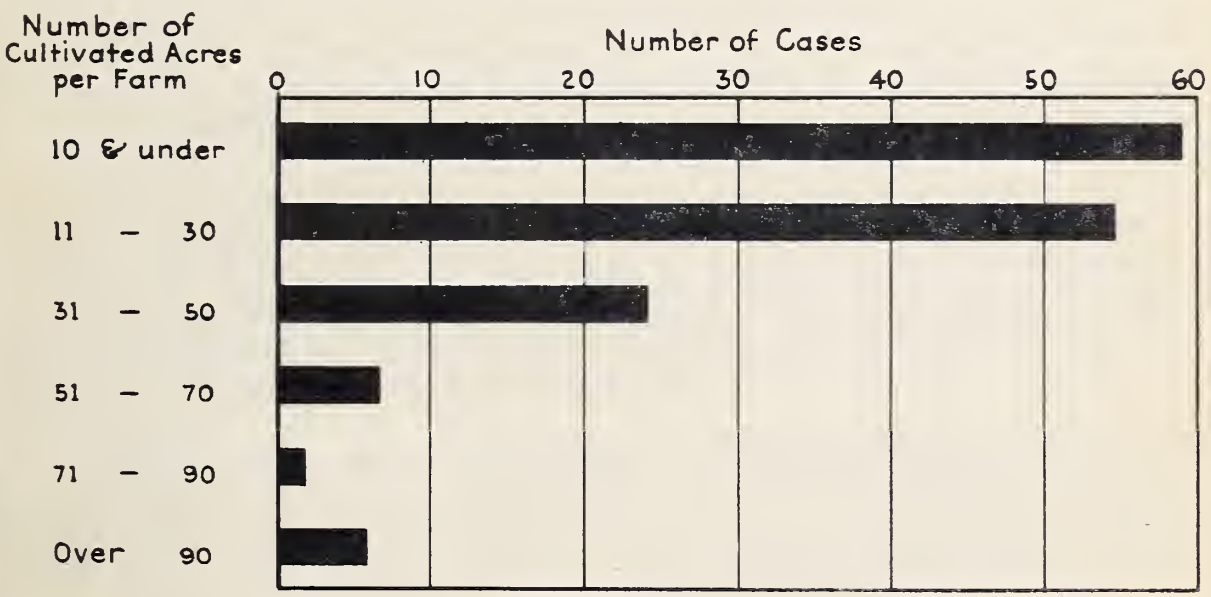
Several thousand acres of land in the St. Joe River valley could be made productive, if drained. This would require an extensive system of dikes and it might be necessary to postpone such reclamation until flood-control measures can be applied elsewhere in the watershed of the Spokane River.

In regard to the cut-over lands, some of the difficulties of reclamation have already been referred to, but apparently many individuals are willing to write off at a low figure their labor cost in clearing land. Some lands are easier to clear than others. In selecting a location, it is important to remember that the nature of the cover as to tree species, age of stand, density of stand, elapsed time since logging, etc., are all very important from the standpoint

FIGURE 5 — VARIATION IN CULTIVATED ACREAGE PER FARM

Closed Rural Relief Cases, Benewah County, Idaho

JUNE 1936



Prepared in cooperation with Idaho State Planning Board, Idaho Emergency Relief Administration and Works Progress Administration.

of clearing costs. 13/ As far as specific areas are concerned, the settlement of lands near Benewah and Treffry should be deferred until other lands, such as those near Emida and Fernwood, have been developed.

In view of the difficulties encountered by individuals in developing cut-over lands, the question presents itself as to the desirability of giving public assistance to such reclamation. There is considerable justification for such assistance because it will operate to rehabilitate people already in the area. Not only would the economic status of the population be improved, but the burden of relief costs would be reduced.

Apparently the conditions under which much of the cut-over land of the county has been cleared have now changed. The decline in the employment available in the timber industry has brought about a corresponding decline in the extent to which land-clearing operations have been supported by the supplementary employment heretofore available in that industry. If cut-over lands are to be used for agriculture, some means must be found whereby expenditures of time, labor, and capital in land-clearing can be reduced. This becomes increasingly important as the pressure of population on the available land resources becomes more acute, as has been the case during the last few years. In furthering this objective, the possibilities of land clearing by machine methods should be investigated. It may also be desirable to investigate the possibilities of setting up relief projects to clear land, as this would solve the problem of insufficient cultivated land which is the chief reason for dependency in cut-over areas.

On the other hand, settlement in non-agricultural areas should be discouraged by zoning regulations and other directional measures. Non-conforming users will gradually move out as a result of unfavorable agricultural conditions, but only after serious losses have been suffered by the individuals and by society.

The location of roads, schools, and marketing facilities in relation to present and potential settlement can be observed from figure 3. The distribution of these services from the standpoint of the agricultural lands is apparently adequate in most cases, although the mileage of gravel roads should be extended. This would probably permit the marketing in the form of sweet cream or market milk rather than as sour cream a larger proportion of the butterfat produced. This would tend to increase the income from the enterprises. Although there is a creamery at St. Maries, the chief market for livestock products is at Spokane.

No attempt has been made to develop recommendations as to desirable changes in the pattern of school locations, in the light of this

13/ The Cutover Lands of Northern Idaho, by J. H. Christ, Idaho Agricultural Experiment Station Bulletin 158, contains valuable information relative to land clearing and choice of crops.

land classification, because an intensive study of this problem is being made by the State Department of Public Instruction.

When the costs of developing even the best cut-over lands are considered, it is important that investments, both public and private, which depend upon an agricultural economy should be directed only toward those lands that will give a sufficiently large and stable return to justify their development.

LAND OWNERSHIP - RELATION TO FOREST DEVELOPMENT

Reference has already been made to the obstacle that the checkered ownership pattern interposes to the attainment of a sound forestry program, but the ownership complex is important, not only to a forestry program, but to all types of land use (fig. 6).

The extent of the holdings in various ownerships in 1933 can be observed from table 7. It is of interest that of the privately-owned lands, 105,603 acres, or 35.2 percent, are owned by corporations other than credit institutions - that is, primarily by lumber companies.

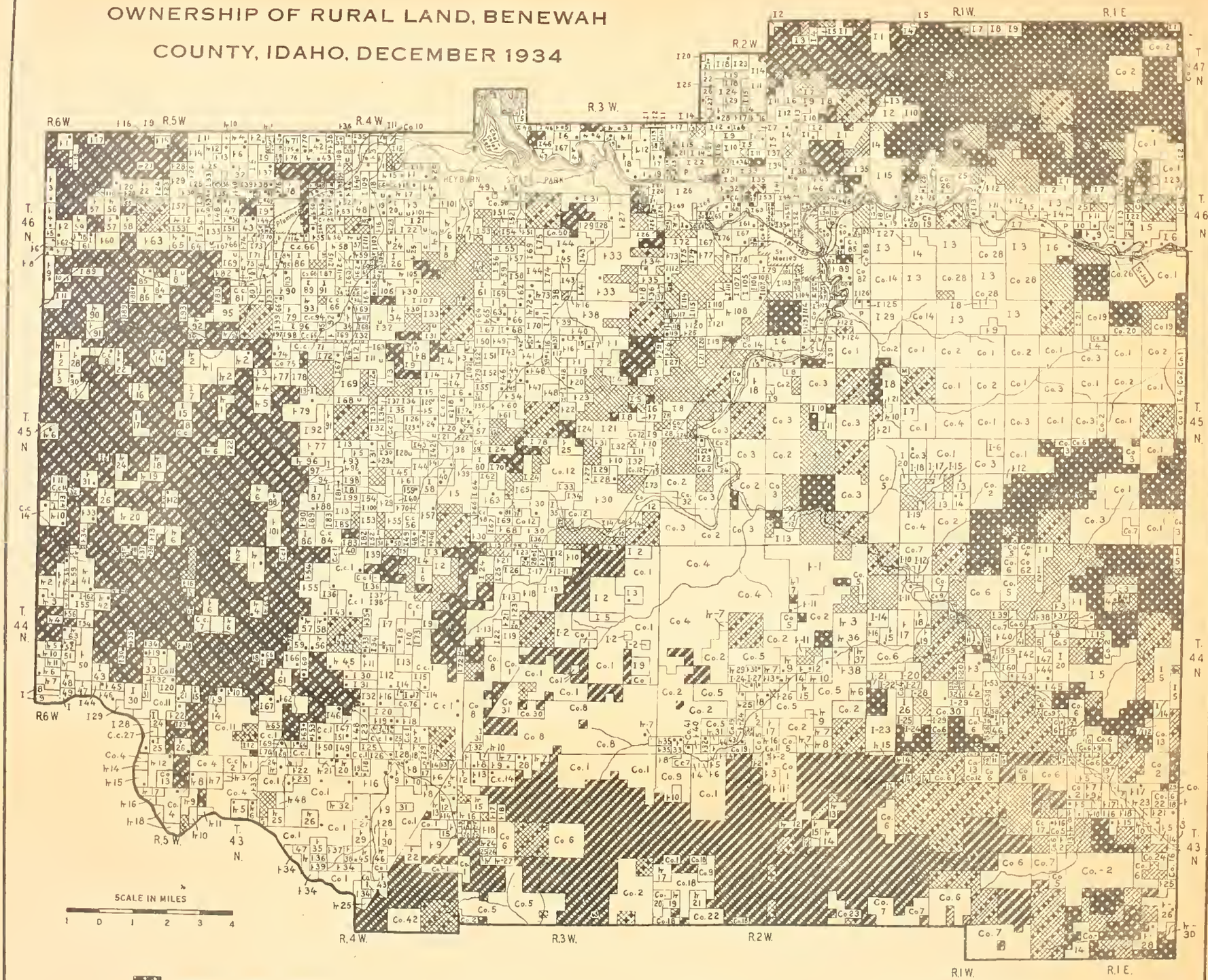
The relative proportions of the various types of ownership are especially significant when considered in terms of the forest lands. Reference to table 8 discloses that, as between public and private holdings, the private owners control a much greater proportion of the sawlog stands than they do of the total forest area. The importance of this relationship can be readily understood when the requirements of a sustained yield rotation are studied. It is essential that there be a desirable distribution of timber by age classes. At present, there is a deficiency of timber in the age class 41-to-80 years old. 14/ This is, in large part, the result of past overcutting although forest fires have been partly responsible. With about 75.5 percent of the sawlog stands in private ownership, it is probable that the maldistribution of age classes will have even more serious effect on the stability of lumbering activities, unless steps can be taken to encourage a cutting policy for the privately-owned stands which will extend the available timber supply over a longer period.

The further fact that the various ownerships in the forest areas are so intermingled has serious consequences. Such an ownership pattern not only makes fire protection more difficult (especially where the holdings are settled), but it makes a comprehensive program for restoring the forest cover on denuded areas virtually impossible. It is much more efficient to deal with large units, that are blocked up according to a logical plan, when administering a forest program.

14/ Forest Statistics, Benewah County, op. cit., p. 18.

FIGURE 6

OWNERSHIP OF RURAL LAND, BENEWAH COUNTY, IDAHO, DECEMBER 1934



NATIONAL INDIAN RESERVATION
NATIONAL FOREST
NATIONAL PUBLIC DOMAIN
Co. COMPANY
C.c. CREDIT CORPORATION
COUNTY
M MUNICIPAL
STATE LAND
STATE SCHOOL LAND
Ir INDIVIDUAL NONRESIDENT
I INDIVIDUAL RESIDENT
I IDLE LAND

• OCCUPIED FARM HOME ▲ SEASONALLY OCCUPIED FARM HOME ▫ VACANT FARM HOME

COMPILED UNDER THE DIRECTION OF DR. PAUL EKE, C. O YOUNGSTROM, C. TJERANDSEN, DEPARTMENT OF AGRICULTURAL ECONOMICS, UNIVERSITY OF IDAHO, MOSCOW, IDAHO COOPERATING WITH IDAHO EMERGENCY RELIEF ADMINISTRATION, IDAHO STATE PLANNING BOARD, U. S. FOREST SERVICE, U. S. BUREAU OF SOILS

U. S. DEPARTMENT OF AGRICULTURE

NEG. 35305 BUREAU OF AGRICULTURAL ECONOMICS

Table 7.--Assessor's classification of land, 1933 1/
Benewah County

Assessor's classification	Acreage in class	Percentage of total area
	Acres	Percent
Private		
Agricultural land	36,156	7.23
Grazing land	51,285	10.24
Waste land	4,711	.94
Timber land	85,703	17.11
Cut-over land	119,244	23.81
Land within corporate limits of municipalities	2,369	.47
Other land	668	.13
Total private land	300,136	59.93
Public		
Federal		
National Forest	48,275	9.64
Indian land	54,812	10.95
Public domain	30,306	6.05
Total Federal land	133,393	26.64
State		
School	31,158	6.22
Contract	200	.04
Park	6,858	1.37
Other	120	.02
Total State land	38,336	7.65
County	28,844	5.77
Municipal	67	.01
Total public land	200,640	40.07
Total county land	500,776	100.00

1/ Basic Data for Land Classification of Benewah County, Idaho. Paul A. Eke and C. O. Youngstrom, Idaho Agricultural Experiment Station, Mimeograph Series No. 2, p. 10.

Table 8.--Ownership of forest land and timber Benewah County, 1/

Ownership status	All forest land	Saw-log stands: zones I & II	Volume in saw-log stands zones I & II
	Percent	Percent	Percent
Large private	29.4	56.1	63.8
Small private	32.3	19.4	15.1
State	8.9	8.1	8.0
County	7.6	3.3	2.3
Indian Service	3.6	2.4	1.4
National Forest	11.1	7.5	7.0
Public domain	7.1	3.2	2.4

1/ Forest Statistics, Benewah County, Idaho, p. 11.

These problems relating to ownership raise the question as to the adaptability of various types of ownership to different conditions of land use. The importance of such an appraisal will become evident as the ownership pattern changes, which is likely to occur. It has already been suggested that the management and development of a forest program on cut-over lands is ordinarily not a profitable field for private enterprise. This is indicated by the fact that in 1934, 56 percent of the 209,000 acres of land classified as timber, cut-over, and waste was tax delinquent one or more years. 15/ Most of these lands were cutover. As additional stands are cut, those lands that are obviously unfit for agricultural use will probably become tax delinquent, and eventually the county will take tax title.

If the county should acquire large acreages of such lands, the question arises as to what it can do with them. One alternative is to sell them at private auction with the probability that they will again become the property of the county through tax title. In the meantime, the lands will have become worth even less as a result of misguided land-clearing activities, wood-cutting, carelessness with fire, etc.; the individuals who bought the lands at auction will possibly have lost their capital invested in land-clearing operations; and the county will have been put to considerable expense in taking tax title and in selling these lands.

On the other hand, the county is not organized to manage large areas of forest land. It would seem that some other type of ownership would be desirable. In some cases, counties in north Idaho have donated lands to the Federal Government for management and protection as part of the National Forests. In this way the county is relieved

15/ Basic Data for Land Classification of Benewah County, Idaho, op. cit., p. 22.

of the expense of selling these lands at auction, and the lands receive adequate protection and proper management, while a substantial proportion of the revenues derived from the lands accrues to the county. Another alternative would be to set up legal machinery providing for transfer of tax-title lands, which are non-agricultural, to the State for administration.

But the position of the State with reference to the management of large areas of forest lands is by no means clear. The subject requires further study. Under the Fulmer Act of August 29, 1935 (49 U.S. Stat. 963), the Federal Government is authorized to give financial assistance to the several States in acquiring and managing forest lands. There is grave question, however, whether the State of Idaho, with its comparatively small tax base, is in a position to assume the burdens of protection from fire and disease and of carrying on a positive program for developing all of the cut-over land within the State which should remain in forest use.

It would appear, therefore, that Federal agencies must play a large part in the development of a forest program for Benewah County. Some of the advantages of such participation have already been pointed out. Moreover, the consequences of land misuse in Benewah County are sometimes inter-State in character. An example is the effect that the denudation of forest lands in the Spokane River watershed has on floods that may cause considerable damage at Spokane, Washington.

In view of the advantages of administering forest lands in large units, a definite program for the exchange and consolidation of forest lands in various ownerships should be instituted as soon as possible. Additional legislation is needed to effectuate a recent amendment to the State Constitution which will permit the State to exchange lands with the Federal Government.

The matter of the relation of type of ownership to land use is of such importance that it not only deserves but requires the attention of planning agencies in the county and in the State.

CONCLUSION

In conclusion, it should be emphasized that a land classification such as this must of necessity be somewhat generalized. Unquestionably some locations within an area mapped as agricultural will not prove successful from a farming standpoint. Furthermore, owing to lack of sufficient detail in the soil survey, the boundary between the agricultural and non-agricultural areas must not be accepted without question. For these reasons, each location should be investigated carefully before any investment is made or settlement takes place, especially near the boundaries of the non-agricultural areas. However, the general accuracy of the broad classifications and conclusions and the figures for acreage of lands in each classification, are but nominally affected. Often the

county agricultural agent can be of assistance in suggesting desirable locations. Each location must be investigated thoroughly and if soil erosion and depletion of soil fertility are to be prevented, only the best farming practices can be followed.

APPENDIX

In recognition of the land-use problems in Benewah County and the need for sound policies of land utilization and land settlement, the following resolution was adopted June 6, 1938, by the County Commissioners and the Committee Representing Farmers:

Resolution

"WHEREAS, decline in the timber industry due to depletion of timber supplies and migration of settlers from other regions has caused a rapid influx of settlers into the rural areas of Benewah County, and

"WHEREAS, there is great variation in the agricultural productivity of cut-over land in Benewah County, and land clearing is a time-consuming and expensive operation to be undertaken only upon lands of known worth, and

"WHEREAS, past undirected settlement has resulted in losses of capital invested in poor farm lands, heavy relief loads, high per capita cost of roads and schools and deterioration of soil and loss of watershed values on certain lands, and

"WHEREAS, it is felt that a sound land use program will result in the greatest permanent welfare of the people of Benewah County, and

"WHEREAS, this committee consisting of Mr. S. E. Baldwin, Mr. Charles Doupe, and Mr. W. S. Bennett, and the county commissioners, has had under consideration 'A Land Use Classification of Benewah County,' a report prepared by the Bureau of Agricultural Economics of the United States Department of Agriculture,

"BE IT RESOLVED THAT:

1. The information contained in this classification study be made available to the people of the county in order that better use of the land of the county may be encouraged.

2. In disposing of county-owned land, the county, as a general policy, should discourage the sale to prospective farmers of lands classified as non-agricultural.

3. The cooperation of other land-selling agencies be requested in furthering the recommendations embodied in this report in order that the sale of lands in non-agricultural areas to prospective farmers be discouraged.

4. The improvement and extension of public services be not encouraged in non-agricultural areas unless such improvements and extensions are necessary parts of a comprehensive plan involving a wider area.

5. Loans for the development of lands for agricultural purposes be encouraged only when they lie in agricultural areas.

6. Land clearing projects in agricultural areas receive immediate consideration in the permanent solution of the relief problem.

7. Local planning agencies give consideration to the proper use and administration of the lands classified as non-agricultural and, working through all available channels, seek to bring about such consolidation of ownership, under the agency or agencies most capable of administering said lands, as is necessary to insure the use of the lands for the permanent welfare of the people of the County, State, and Nation.

"Unanimously adopted June 6, 1938 by the following:

COUNTY COMMISSIONERS

Roger Tyler
H. H. Renfro
E. E. McLaughlin

COMMITTEE REPRESENTING FARMERS

S. E. Baldwin
Charles Doupe
W. S. Bennett"

REFERENCES

Bureau of Public Roads, U.S. Department of Agriculture, and Bureau of Highways, State of Idaho - Road and Public Service Maps, 1937.

Christ, J. H. - The Cutover Lands of Northern Idaho, Idaho Agricultural Experiment Station Bulletin 169, 1930.

Department of Agricultural Economics, University of Idaho - Maps
"Ownership of Rural Lands, 1935."
"Proportion of Agricultural Land, 1935."
"Assessed Valuation of Agricultural Land, 1935."
"Tax Delinquency, 1935."
"Average Wheat Yields, 1935."

Department of Agronomy, University of Idaho - Agronomic Recommendations from "Regional Agricultural Adjustment Report, 1935." (Unpublished.)

Eke, Paul A. and Youngstrom, C. O. - Basic Data for Land Classification of Benewah County, Idaho, Idaho Agricultural Experiment Station, Mimeograph Series No. 2.

Idaho Emergency Relief Administration - "Relief Case Records, 1935." (Unpublished.)

Northern Rocky Mountain Forest and Range Experiment Station, Forest Survey Release No. 8, Forest Statistics, Benewah County, Idaho.

Poulson, E. N., and Platt, K. B., U. S. Bureau of Chemistry and Soils - Soil Survey of Benewah County, Idaho, 1930.

Statewide Highway Planning Survey, 1936. Idaho Bureau of Highways and Bureau of Public Roads, U.S. Department of Agriculture, cooperating.

Superintendent of Schools, Benewah County - Annual Reports, 1930 to 1935.

Tjerandsen, Carl, Resettlement Administration, Region XI - "Current and Recent Rural Occupancy in Idaho," 1936. (Unpublished.)

U. S. Bureau of Census - Census of Agriculture, 1930 and 1935.

U. S. Forest Service, Region I - Cover Type Maps, 1935; Aerial Photographs, 1934.